Claims

What is claimed is:

1. A material model comprising a set of microstructural entities comprising grains, particulates and particles aligned in such a way with the applied load that each of said entities rotates through an angle to remain in equilibrium and thereby creates induced stresses on the surrounding matrix material and in its interior that arise from the strain on the matrix material through said rotation.

2. The material model as defined in claim 1, wherein said microstructural entities that through said rotation create from the resulting strain in the surrounding matrix material alternating regions of compressive and tensile stress in both the matrix material and in the interiors of the said microstructural entities that then add to the original stresses around cracks, pores and particles to produce attenuated stresses and strain energy around said cracks, pores and particles.

3. The material model as defined in claim 1, wherein said particles are smaller than said grains and particulates, said smaller particles undergoing a rotation to remain in equilibrium themselves within the tensile stress fields induced by the larger grains themselves through strain put on the surrounding matrix through said rotation from the applied load.

4. The material model as defined in claim 1, wherein said particles are smaller than said grains and particulates, said smaller particles taking on one of its sides one of the induced compressive stresses from the strain in the matrix arising from the rotation of the said larger grains and particulates and transmitting the compressive stress through its interior and out its other side as a point source in which the attenuation of the compressive stress changes from a dependence upon distance from a –n power in several terms to that of a power of –1.

5. The material model as defined in claim 1, wherein said microstructural entities create through strain in the matrix and in their interiors through rotation alternating regions of tension and compression that serve as initial conditions for vibrational motion in the composite material lattice that serves to absorb strain energy whose release could promote crack propagation.

6. The material as defined in claim 1, wherein said applied stress comprises tensile stress.

7. The material as defined in claim 1, wherein said applied stress comprises compressive stress.

8. The material as defined in claim 1, further including a net moment as a sum of M_0 from the applied load and M_{ex} from the stress fields from other

microstructural entities, wherein said rotational movement includes a direction of rotation, said direction being dependent upon the orientation of said microstructural entities with respect to the local applied load such that said net moment on each entity is zero.